# PLANTERS' BULLETIN

## OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

PLANTERS' BULLETIN THIRTYTHREE

CONTENTS


| | Page |
|---|---|
| Editorial: Weighing the Losses | 103 |
| Jungle Clearing | 105 |
| Latex Skim: The Dunlop Process | 108 |
| Treatment of Skim Latex | 111 |
| Erection of Oil Engines | 113 |
| Notes | 104, 112, 116 |
| Index 1957 | 118 |



Price
50 Cents

November
1957

## Planters' Bulletin—Back Issues

We recommend new subscribers to obtain a set of recent back issues. From July 1955 to date, *Planters' Bulletin 19* to *33* is available for $7.50. Add postage, if outside Malaya. The amount can be debited against your deposit account, provided this is in funds. If it is not, kindly remit a further $10. If you are oversea, you may find it convenient to remit $20 (Malayan) or more, to avoid the need for frequent drafts in foreign currency. We send you an annual statement of account.

Other useful issues of *Planters' Bulletin* are those containing the annual indexes, *Planters' Bulletin 3, 9* and *15*. These are still available, at the usual price of 50 cents each.

We can provide a special temporary binder for $5 post free in Malaya. A dozen issues can readily be inserted one by one, as they arrive. This binder keeps recent issues in good condition for permanent binding in due course, when a sufficient number has been accumulated.

*Unless you have a deposit account*
*Please remit with your order*

OUR COVER SHOWS A CLOSE UP VIEW OF A JUNGLE BURN

*See page 105*

# PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur November 1957 Number 33

## Editorial: Weighing the Losses

Plant pathology is essentially concerned, in its practical applications, with minimising losses. There is the loss of crop resulting from a pathological condition left uncontrolled; the reduced loss from the same cause when control measures are undertaken; the loss represented by the cost of the control measures. Clearly, for control measures to be justified, the second and third must total less than the first. For several diseases encountered in rubber cultivation this condition is not fulfilled – the damage they do is too little for control measures to be worthwhile. Still more is this true of pests, all but a few of which are effectively controlled by natural causes.

The way in which the balance operates is well illustrated by *Oidium*, as a cause of secondary leaf fall. In Malaya it is not worth treating, whereas in Ceylon the damage is so severe that control measures are essential. In contrast, root disease, mouldy rot and pink disease can only in exceptional circumstances be allowed to run their course. Though the spread of root disease is to some degree inhibited by soil factors, these are not enough; once established, root disease spreads indefinitely. Here, then, is a case for weighing the costs. In old unselected hevea which has but a short productive life ahead of it, the disease can be left untreated because it is simpler to undertake control measures at the time of replanting. In mature plantations of improved material there comes the time when it is tempting to leave root disease alone. Though generalised calculations suggest that this policy is uneconomic in the long run, each case must be individually evaluated, and this is outside our scope.

Our main function in this sphere is to find and make known cheaper methods of disease control. Articles providing the information that is needed have appeared in *Planters' Bulletin* and will be revised as found necessary in the light of experimental results. They have also been used for the additional function of helping planters to appraise disease situations correctly. Even so, diseases are not always correctly identified, and our advisory work shows that harmless organisms are sometimes treated as if they were pathogenic. Not every bracket on a dead stump is a fructification of a root disease fungus. Still more deceptive, not every white rhizomorph is a strand of *Fomes lignosus*. Nor is a mould growing on the superficial layers of newly tapped bark necessarily mouldy rot. There is a simple criterion that should not be overlooked: If the disease is untreated, does it invade and kill the underlying tissue?

We have covered all the important diseases in advisory articles, and, recognising the need for making descriptions of them more readily available, we are now preparing the information in collected from. Meanwhile, our advisory service is always available in cases of doubt.

## Thinning with 2,4,5-T

Provided the following precautions are taken, 2,4,5-T can be confidently recommended as a tree poison for hevea. The commercial preparation contains 5% of 2,4,5-T ester in diesel oil, and this may be diluted with an equal volume of diesel oil so that the concentration is brought down to 2½%. This strength is fully effective for killing young trees under 30 inches in girth.

The trees should be painted from one foot above ground level upward, and no excess should be applied. If the liquid is spilt on the ground, it may be taken up by the roots of other trees which are not intended for poisoning. Too generous an application may allow an excess to flow down the stem, with the same result. These were the causes of unexpected casualties which have been brought to our attention.

To kill old rubber trees the commercial preparation should be applied liberally at full strength (5%) from ground level upward; that excess may be absorbed in the ground does not matter in these circumstances since the 2,4,5-T will decompose completely before the roots of the young seedlings start to spread.

## Identification of Clones

We occasionally receive requests for our clone inspectors to identify individual trees, intended as a source of branch budwood for use in field or nursery. We are pleased to meet this requirement, as far as more pressing work allows. When our inspectors make such visits they are also able to assist by indicating the most suitable brances from which budwood can be taken.

A much simpler method of clone identification, however, is by means of its seed. Managers must be certain that the seed sample is obtained from the tree to be identified, either by picking nearly mature pods or by bagging pods. Seed should never be collected from the ground for this purpose.

Seeds from different trees should be numbered, or packed in separate envelopes, and sent to us (P.O. Box 150, Kuala Lumpur) addressed for the attention of the Botanical Division. We shall then compare them against our type specimens, and return the correct identification to the estate within a matter of hours. We hold type specimens of seeds of all clones likely to be employed in replantings in Malaya.

We do not return seed unless a request accompanies the sample. No charge is made for the service which is a cheap, rapid and efficient method of identifying individual trees.

## Sole Crepe

Our associates at the British Rubber Producers' Research Association have brought the following complaint to our notice.

Manufacturers have recently found thin sole crepe to be dusted with talc instead of being interleaved with paper to prevent adhesion. This necessitated a solvent dip before plying and was a considerable nuisance. There is good reason to believe that the sole crepes were not of Malayan origin.

We nevertheless bring this matter to the attention of sole crepe producers to emphasise the danger of using talc in packing sole crepe instead of the normal recognised materials.

# Jungle Clearing

*The plume of smoke arising from this jungle burn extended well beyond the limits of the photograph. Before such a burn is carried out the police should be informed.*

IN ADDITION TO EXTENSIVE replanting programmes which are in progress throughout the country, a small but steadily increasing area of new planting, mostly on jungle land, is being undertaken annually and a brief account with some views on the possible methods of preparing jungle land for planting might appear timely.

Between 1934 and 1941 the Rubber Restriction Scheme either prohibited new planting or permitted only a very limited amount apart from planting done for experimental purposes. During these years soil conservation problems were receiving increasing attention and wherever new planting was undertaken there was a general departure from the older methods of clean clearing of surface timber in favour of the minimum amount of clearing and burning after felling.

Towards the end of this period the accepted practice was either to fell jungle and put a light burn over the area or, where the jungle was not too heavy, to fell and prepare the land for planting without any burn. Both methods aimed at reducing soil exposure. Clearing without burning achieved this object more completely but, briefly, the theoretical advantages of leaving the jungle unburned and stacked between planting rows – thereby conserving all humic material and avoiding any sterilisation of soil by burning – met with certain practical disadvantages. Amongst these were the difficulty of movement for labour and supervision, the difficulty of controlling root disease and undesirable growths including lalang, increased pest damage and danger of accidental fire.

Clearing without a burn was usually only slightly more expensive where the jungle was light. However, with the increasing high cost of present day labour the margin in favour of a light burn is likely to be considerable and probably sufficient to abandon ideas of clearing without a burn.

To combat increasing labour rates both heavy and light tractors are being used with a variety of equipment for all manner of estate work. If it is required to use tractors and mechanical equipment for estate maintenance work, then it will be necessary to revert to cleaner clearing methods initially to enable the tractors to move freely within the area. The degree of clearing of surface timber and stumps for this purpose would depend on just what type of equipment it is intended to work in the area in future. Clearing of this nature could be undertaken with heavy tractors. We have no experience of mechanical clearing of

jungle land but a few points should not be overlooked in the eagerness to adopt mechanical methods.

Excessive distrurbance of the soil by uprooting jungle stumps and dozing with heavy tractors would undoubtedly mean sacrificing the best of soil conditions to obtain a surface free of heavy timber. In the steeper areas and the wetter land machinery could not be used. Clean clearing and deep rooting of old rubber land for replanting may be justified in that it helps to eradicate root disease but on jungle soil, where root disease is not normally so prevalent, the economic advantage of this practice is questionable. The cost of clean clearing by tractors would be more expensive than the normal amount of manual clearing necessary along the planting rows after a light burn, and on grounds of expenditure alone this higher initial cost would need to be evaluated in connection with any estimated reduction in subsequent costs of maintenance.

## MANUAL CLEARING

A few notes on the manual method of preparing jungle land for planting are given.

*Boundary Demarcation* – The boundary of the clearing should be demarcated with a rentis about 6 feet wide.

*Fire Belts* – As the area is to be burned it will be necessary to leave a strip of standing jungle along any planted boundary or forest reserve to avoid damage by scorching or by accidental fire to adjoining property. A strip of jungle about 2 chains wide should suffice. Another rentis 6 feet wide should be cleared to demarcate the interior of the fire belt and the area for felling. Care should be taken to keep this rentis clear of timber; no trees should be felled across the rentis, whereby dead wood in the fire belt could easily catch fire. The fire belts can be felled after the main area has been burned, and can be burned off carefully or cleared without burning.

*Felling* – First all belukar should be slashed to the ground. The trees should then be felled at a convenient working height. Subsequent clearing operations are much easier if the trees are felled as for as possible in the direction of the future planting rows, or on the contour if the land is hilly.

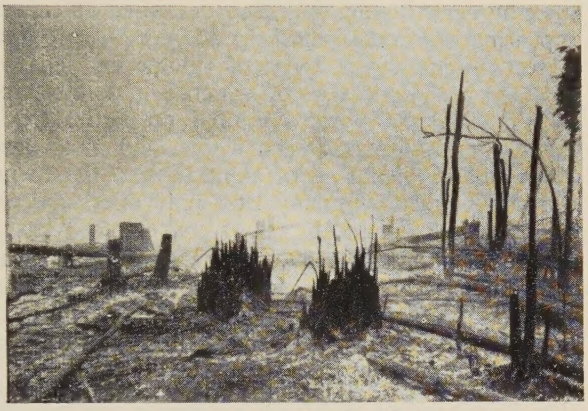
*Burning* – The severity of the burn will depend upon how long the felled jungle is left to dry out. By burning off about two months after completing felling, a sufficiently light burn of the brushwood and smaller timber will be obtained. Large areas are better burned off in blocks of 100 to 150 acres at a time. Between these blocks there should be of course a very safe fire belt of standing jungle.

A safe and satisfactory method of burning is to light fires at frequent intervals around the perimeter of the clearing and to allow the fire to develop and spread inward of its own accord. If any one boundary of the clearing appears to present a particular fire control problem, it would be better to light that side first and give it a start on the remainder of the clearing. Adequate labour should be provided and equipped suitably for fire fighting and watching along the boundaries until the danger of fire spreading is past.

An alternative method of burning, frequently advocated, is to clear rough tracks through the felled jungle at intervals of 5 to 10 chains and

to put a gang of labourers through the clearing in line abreast formation lighting fires as they proceed, preferably against the wind, from one boundary to another. This will give a quicker burn but it is difficult to control over large areas.

Whichever method is adopted all labour taking part in the burn should be well briefed in their duties, and the various boundaries or sections of the clearing should be put in charge of responsible people. The essentials for a successful burn are that there have been at least three days without any rain, that the overnight dew has been dried out by several hours of sunshine and that there is at least a slight breeze. It is advisable to notify local authorities (in Malaya, the O.C.P.D. and Forestry Officer) and neighbouring estates of the intention to burn.



*After the burn.*

*Lining* – After burning, lining is the next job. This needs no description and can follow any required pattern. Where much timber remains after the burn, however, it would be advisable to do the lining in two stages: first, to mark a skeleton lining of the planting rows with pegs a chain or more apart and later, when the timber has been cleared from these rows, to peg the planting points accurately.

*Clearing* – All unburned loose timber should be cleared from a 5 to 6 foot width along the planting rows or contours. This work will be made much easier if the felling has been well done and the trees are lying roughly in line with the planting rows. It is advisable to give both felling and clearing work to the same contractor (and the same labourers, if possible) to insure reasonable and cheaper work. The logs are sawn into convenient lengths and slewed between the planting rows.

The extent of stumping along the planting rows rather depends on funds available. It would be sufficient to remove all stumps up to 6 inches in diameter from the planting row. Larger ones could be removed in the vicinity of planting points, but where stumps much beyond 12 inches in diameter interfere with planting points, their removal would not normally be worth the cost. Such instances are remarkably infrequent and the initial planting density would no doubt allow a certain reduction in stand by thinning which could absorb such vacancies. If the clearing is to be terraced, stumping can be done in conjunction with terracing.

Beyond the clearing procedure the remainder of the work entailed in preparing jungle land for planting is essentially the same as for replanted land.

# Latex Skim: The Dunlop Process

*We have pleasure in presenting a guest article from Dunlop Malayan Estates Ltd describing the Dunlop process for making improved rubber from skim. We follow this article with some comments based on our own experience of the treatment of skim rubber.*

LATEX SKIM, which is produced during the process of concentrating latex by centrifuging, has been described and discussed in three articles appearing in *Planters' Bulletin 14* and *17*. The total ban on its inclusion in recognised market types of rubber has led to the patented process about to be described* – by which it is possible to produce a clean rubber of good quality with normal properties from latex skim. For the benefit of the industry as a whole, and in an attempt to minimise the difficulties of disposing of skim rubber, the owners of the patent, the Dunlop Rubber Company Ltd, now offer free and unrestricted use of the process to all producers of concentrated latex.

Latex skim has a low dry rubber content varying from 4 to 8% according to centrifuging conditions, and contains an abnormally high proportion of non-rubber constituents such as fatty acids, proteins, sugars and inorganic salts. Sheet or crepe produced from latex skim by ordinary methods of coagulation with acids, or by fermentation processes, is heavily loaded with these non-rubber substances which impart undesirable properties to the rubber.

Because of these undesirable properties, the use of skim products presents considerable trouble to the manufacturer (*Planters' Bulletin 27*, page 111), and a test has been devised for the identification of skim rubber to detect adulteration in standard market grades (*Planters' Bulletin 14*, page 98). The marketing of skim rubber is already a serious problem to the producer and as production of concentrated latex increases the problem will become more acute.

The Dunlop process makes it possible to produce a good quality clean rubber with normal properties from latex skim, using a proteolytic enzyme such as trypsin. A typical analysis of the improved skim rubber produced by this process will be seen to be similar to that of RSS 1, apart from a somewhat higher acetone extract:

| | *Treated Skim Rubber* | *RSS 1* |
|---|---|---|
| Moisture | 0.40% | 0.30% |
| Protein (calculated from nitrogen content) | 2.75% | 2.50% |
| Acetone extract | 5.48% | 2.50% |
| Ash | 0.23% | 0.20% |
| Dirt content (325 mesh screen) | 0.01% | 0.025% |
| Copper | 7 p.p.m. | 4 p.p.m. |
| Rubber hydrocarbon | 91.13% | 94.45% |

* *British Patent 695,813*

Reports from consumers who have used the treated skim rubber for several years have been satisfactory and a typical example is quoted:

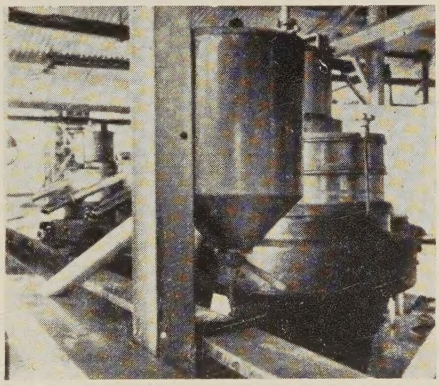
| | |
|---|---|
| Rubber hydrocarbon content | 90 to 93% |
| Copper content | less than 10 p.p.m. |
| Colour | satisfactory |
| Cleanliness | satisfactory |
| Ageing at 80°C (Geer oven) | comparable with RSS |
| Resilience | lower than RSS |
| Rate of cure | top range of yellow technical classification |

## TRYPSIN TREATMENT PROCESS

This process, which is simple to operate, has been in use on a commercial scale at four different latex concentrate factories for the past five years. The average recovery of first quality improved skim rubber has been approximately 9% of the total dry rubber content of the field latex centrifuged, with concentrate recovery at 86.5%.

Fresh latex skim from the centrifuges is collected in a tank of suitable size to operate the process batchwise. The tank is lined with wax or other protective coating to prevent iron contamination, is fitted with a pump to enable the skim to be transferred to a trypsin digestion tank, and should preferably be fitted with a stirrer.

*Enzyme Addition* – A dispersion of trypsin in water is added slowly from a stainless steel container to the flume carrying the skim from the centrifuges to the collection tank, the rate of addition of the dispersion being so adjusted that it lasts throughout the collection of the particular batch of skim. The quantity of trypsin required depends on centrifuging conditions and on the proteolytic activity of the trypsin.* With a skim of about 6% dry rubber content, 1 to 1¼ pounds of a good quality trypsin per 1,000 gallons of skim will give satisfactory results, but the nitrogen content of the finished product – which should not exceed 0.5%, equivalent to 3.13% of protein – will determine the actual quantity to be used. The dispersion is made by



*Trypsin dispersion dripping into skim flume from stainless steel dispenser.*

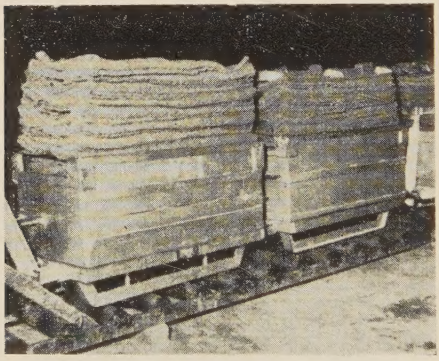
* Trypsin is an enzyme – an organic substance which causes chemical change to happen – whose special function is to help the digestion of proteins. Proteolytic activity is a measure of the effectiveness of an enzyme in breaking up proteins.

adding just enough water to wet the trypsin sufficiently to mix into a stiff paste. More water is then added gradually to give a final dispersion of 8% trypsin. After standing for 15 minutes with frequent stirring the dispersion is ready for use. The dispersion should be freshly made for each batch of skim.

*Deproteinisation* – The mixture of skim and trypsin is pumped from the collection tank to a wax lined digestion tank and allowed to stand for 24 hours while deproteinisation proceeds. Ammonia is then removed by agitating the skim with stirrers and at the same time blowing a current of air across the surface.

*Coagulation* – When the ammonia content is reduced to approximately 0.1% the skim is ready for coagulation. It is run into tiled coagulating tanks to which 0.05% of sodium meta-bisulphite solution (on the skim) has previously been added. Sufficient diluted formic acid is then added gradually and with constant stirring to effect coagulation. Usually about 20 pounds of acid per 1,000 gallons of skim is required but the quantity depends on the residual ammonia content of the skim.

When coagulation is complete, as indicated by a clear amber serum, the coagulum is cut into strips and transferred to a soaking tank containing clean water, for four hours.



*Deproteinised skim crepe ready for pressing into 50 lb bales.*

*Crepeing* – After soaking, the coagulum is passed successively through crepeing machines with a plentiful supply of water for washing, until a medium fine crepe is produced. The crepe is then dried by hanging on racks or trolleys, preferably at ordinary temperature; if heat is necessary to dry, the temperature should not exceed 95°F. The dried crepe is carefully sorted to remove any sludge or other contamination and is then lightly dusted with talc and packed for shipment.

This description of the process shows that the only additional cost, by comparison with the standard skim coagulation process, is for the trypsin used. Good quality trypsin costs at present just under 30 shillings a pound c.i.f. Malayan ports, but its proteolytic activity varies considerably as between suppliers. The R.R.I. has examined supplies from many sources and will be able to advise on this particular matter, while the owners of the patent will be pleased to supply any additional information which may be required for the successful operation of the process – which incidentally not only produces a rubber of improved quality but eliminates the obnoxious odour usually associated with latex skim.

T.H. Barnwell

# Treatment of Skim Rubber

WHEN FIELD LATEX IS CENTRIFUGED it is separated into two portions of about the same volume, the concentrate and the skim. The latter has a low rubber content and contains the majority of the non-rubber substances. The composition of commercial skim varies with the type of centrifuge, the amount of rubber in the field latex, the rate of throughput and the mode of factory operation. The dry rubber content of commercial skim latex can lie between 2.5 and 10%.

Skim latex may be coagulated spontaneously in open pits. Normal practice is to coagulate with sulphuric acid although formic acid and calcium chloride are sometimes used. The coagulum is processed into sheet or crepe. Most producers take some pains to improve the appearance of their skim rubber because it is normally sold on sample. Such procedures, however, have little effect upon the chemical composition or technical properties, which differ from those of RSS. Commercial skim rubber may contain between 70 and 85% rubber hydrocarbon, between 5 and 10% fatty material and between 9 and 18% of protein compared with average figures for RSS of 95% hydrocarbon, 3% fats and 2% protein.

Two processes have been patented for the production of improved rubbers from skim latex by the removal of non-rubbers. We have tried the Dunlop trypsin process, described in the preceding article, and find that it works satisfactorily but cannot be applied to skim latex of d.r.c. below 4%. In our experience the treated rubber has a rate of cure near the lower strain limit of blue technical classification. We have worked out a similar trypsin process* in which the digestion was carried out at an optimum pH and was further aided by the presence of calcium ions. Spontaneous coagulation dispensed with the need for coagulating acid but unfortunately the use of the only cheap calcium salt suitable, namely calcium chloride, impaired some of the technical properties of the rubber produced.

The other process of skim treatment is patented† by the Firestone Tire & Rubber Company. They clarify the skim latex and allow it to coagulate spontaneously. The coagulum is reduced to a finely divided state and treated first with lime water and then with caustic soda solution. Thereafter a conventional antioxidant may be added and the treated rubber is washed, dried, and pressed into bales of convenient size. Firestone AT3 crepe, as the treated skim is called, has a composition approaching that of first quality sheet or crepe. During the process both the high protein and high fat content of the original skim rubber are reduced but the rubber produced has a higher ash content. The Research Association of British Rubber Manufacturers (R.A.B.R.M.) have recently tested Firestone improved skim and they report that its physical properties are similar to those of standard high grade rubbers, apart from ageing characteristics.

* Mr J.E. Morris has described this process in a paper entitled 'Improved Rubbers by the Enzymatic Deproteinisation of Skim Latex' published in the *Proceedings of the Third Rubber Technology Conference, 1954*. A reprint can be provided on request.

† *British Patent 739,750*

Firestone license their patented process on a royalty basis, and provide knowhow. Against an initial deposit of $250 (U.S.) is debited a royalty of 0.2 cents per pound of improved rubber produced. The license becomes paid up at an agreed limit. The company provide all necessary working information including blueprints, and allow the licensee to observe the process in Liberia.

A point to be remembered in all skim purification processes is the reduction in yield. One hundred pounds of normal skim rubber with a hydrocarbon content of 75% will give approximately 82 pounds of Dunlop improved skim containing 91.5% rubber hydrocarbon, or 79 pounds of Firestone improved skim containing 94% rubber hydrocarbon. This loss must be allowed for in the processing costs and may well determine whether the production of an improved skim rubber is an economic proposition for the average producer of latex concentrate. Also, even after purification the rubbers do not completely behave as normal RSS, and market acceptance — at the high RSS price which would make the process profitable — is by no means certain.

### ALTERNATIVE OUTLETS FOR UNTREATED SKIM

There are a limited number of legitimate outlets for untreated skim rubber as well as sheet and crepe. A brown sole crepe made from skim and estate scrap has better properties than one made from scrap alone; the ageing characteristics are improved and the sole crepe is harder. Controlled admixture of skim latex with an excess of field latex, prior to coagulation, produces a sheet with improved physical properties. The properties of cyclised rubber masterbatch are not impaired when skim latex is used to provide the normal rubber component of the masterbatch. All these products are special and cannot be tendered as International or Singapore grades.

R.A.B.R.M. views on the value of untreated skim rubbers appear in *Planters' Bulletin 27* (page 111), and criticism is directed against the wide variability of skim samples in their technological behaviour and in their copper content. These skim rubbers are fast curing rather than scorchy and this may be overcome by a suitable choice of accelerator. Harder, stiffer compounds are usually obtained. These findings underline the fact that a rubber manufacturer can use skim rubber successfully in certain applications provided he knows what rubber he is using and that skim rubber is not surreptitiously admixed with other grades during packing. Standardisation of the kind of skim rubber offered for sale would aid the consumer. This might take two forms, a light coloured material sold on appearance and a skim rubber conforming to a technical specification. Such standardised skim rubbers might well command a better price.

---

Grasses — Any common Malayan grass which is in flower can be identified with the aid of *Malayan Wild Flowers: Monocotyledons* by M.R. Henderson (publishers, Malayan Nature Society).

# Erection of Oil Engines

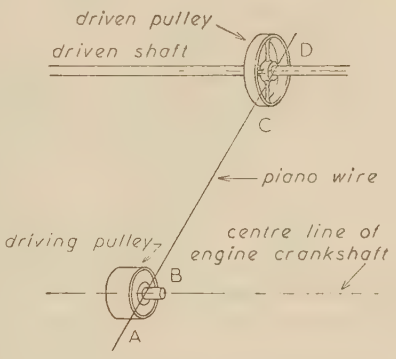
*Following the article 'Foundations for Oil Engines' in our last issue, Planters' Bulletin 32, we now have pleasure in presenting a further article by the Deputy Chief Inspector of Machinery of the Federation of Malaya, on the installation of factory engines.*

---

THE FIRST STAGE IN THE ERECTION OF THE ENGINE on the prepared foundation is to place the holding down bolts in their respective holes. A piece of strong twine should be tied to the upper end of each bolt in order that the bolt can be pulled through the hole in the engine bedplate when the latter is placed on the foundation. If holding down bolts with loose washers are used, care should be taken to see that the washers are resting freely on the heads of the bolts and are not fouling the sides of the bolt holes.

Pieces of steel packing – two inch flat bar four inches long is suitable – should be placed on the foundation on either side of each holding down bolt hole. The thicknesses of the individual pieces of packing are immaterial, provided that the packing is built up to a height of 1 to 1¼ inches. The engine should now be lowered on to the packing. The cord attached to each holding down bolt is threaded through the corresponding hole in the bedplate. The screwed portion of the bolt is pulled through the hole and the nut put on by hand.

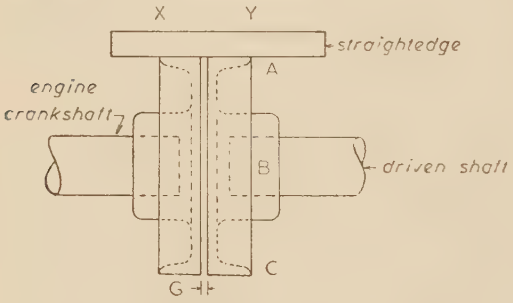
The engine must now be brought into alignment with the machinery it will drive. How this is done depends on the type of drive, and whether or not the driven machinery is already installed. If the layout calls for a belt drive and the driven pulley is already in position, the driving pulley on the engine must be 'lined up' with the former. This is done by attaching a thin steel wire, or cord, to the far side of the driven pulley and leading it to the near side of the driving pulley. The engine is then manoeuvred over the foundation until the wire, or cord, just touches the near side of the driven and the far side of the driving pulleys (*Figure 1*). If the foundation has been laid out accurately, very little movement of the engine will be required and the necessary adjustment will be within the combined clearances of the holding down bolts in their chases and in the bedplate. If the driven pulley is not yet in position, a wire must be set up to represent the line of the drive. The engine is moved over the block until the edge of the rim of the driving pulley is parallel to the wire.




*1. Alignment of engine with belt driven shafting. The piano wire makes contact with the rims of the pulleys at* A, B, C *and* D.

Where the machinery is to be directly driven there will be a half coupling on the end of the engine crankshaft. This must be brought into line with the corresponding half coupling on the driven machine. If the latter is in its final position the engine must be moved over the

block and, if necessary, raised or lowered by adjusting the packing until the two halves of the coupling are in line. The alignment is checked by inserting a feeler gauge between the coupling face at the vertical and horizontal diameters. The feeler gauge reading should be the same at both ends of the horizontal diameter. Variations in the readings on the vertical diameter must be adjusted when the engine is levelled. A straightedge should be placed across the edges of the coupling, at the same positions as the feelers were inserted, to determine that the centre line of the engine and driven machinery coincide (*Figure 2.*) The straight edge should bear against the edges of the coupling along the whole length of the latter at the horizontal diameter. When the straightedge is placed on the vertical diameter it does not touch the edges of the coupling all along the length of the latter; this will be corrected when the engine is levelled. If the driven machinery is not yet installed a wire, or a straightedge, must be set up at the correct height above the datum to represent the horizontal centre line on the face of the driven half of the coupling. The engine is then shifted over the foundation block until the face of the crankshaft coupling is parallel to and touching the wire or straightedge.




*2. Alignment of engine with direct drive. The straightedge makes contact with the rim of the coupling along the entire length* XY *at positions* A, B, C *and* D *(opposite side to* B*). The gaps* G *(exaggerated above) measured at positions* A, B, C *and* D *must be the same.*

This procedure, if carefully carried out, ensures that the vertical planes through the centre lines of the engine and the driven machinery are parallel. The engine must now be levelled. The use of at least two spirit levels is advised for this purpose; one should have a V-base so that it may rest on the crankshaft. Taper wedges in pairs, one above the other, are placed between the bedplate and the foundation. Usually one pair on each side will be sufficient but more than one pair may be necessary under the longer sides of multicylinder engines. The level in the direction of the centre line of the crankshaft is then checked by placing the spirit level on a main bearing journal, and the level at right angles to the centre line by placing the other spirit level on a machined horizontal surface of the bedplate, or on a straightedge bridging the crank pit. The side or corner of the bedplate that is low will be apparent from the spirit levels. The wedges on the low sides are tapped gently until the bubble in each spirit level is central. The spirit levels are then shifted to the other end of the engine. The bubbles may be central on the new positions but it is more likely that some adjustment will be necessary. The same procedure is carried out and the levels are rechecked at the first position. After two or three trials both spirit

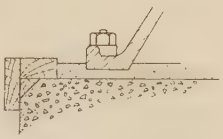
levels will give correct readings in either position. The packing should then be examined. Generally the engine bedplate will be found to be resting on one or two sets of packing and clear of the others. Where it is clear the packing should be built up by the insertion of thin layers of metal. Pieces of kerosene tin or paper brass can be used if not too many are required. The wedges should be left in place.

The next step is to grout in the holding down bolts, with a mixture of equal parts of Portland cement and sand. Only sufficient water as will make the grout flow from a bucket should be added. The mixture is poured into each holding down bolt hole in the foundation until the grout reaches a level about four or five inches from the top. The grouting is then left to set.

When the grouting has become hard the wedges may be removed and the holding down bolts tightened. The engine is now resting on the packing pieces and the levels should be rechecked as before. The spirit levels usually indicate a change in the setting, with one side or corner lower than it should be. This is corrected by slacking off the holding down bolts, wedging up the engine on the low side or corner and inserting strips of paper brass on top of the packing. The wedges are again removed and the holding down bolts retightened. This procedure may be necessary once or twice before the engine is found to be level, with the holding down bolts tightened.

At this stage the alignment of the crankshaft should be checked. If the engine has only one cylinder, and there is no outboard bearing, it is sufficient to make sure that the crankshaft does not bind when turned. If it is a multicylinder engine, clock gauge readings of the crankshaft deflection should be taken at each crank at 90°. The variation in readings taken at 0°, 90°, 180° and 270° from the top dead centre should not exceed one thousandth of inch per foot of stroke. Frequently the alignment is found satisfactory except for the crank nearest to the engine flywheel. The greater variation in the reading is caused by the weight of the engine flywheel. Such engines are usually fitted with an outboard bearing and the readings can be brought within the accepted limit by adjustment of this bearing.

The next step is to fill the space between the top of the foundation block and the bottom of the bedplate with a cement grout. To do this shuttering is fixed around the top of the foundation to a height of about two inches. The grout, which should be of the same proportions as that used for securing the holding down bolts as above, is dumped into the space between the edge of the bedplate and the shuttering, and worked under the bedplate with an iron rod. Sufficient grout should be used so that it fills this space and stands at a level about halfway up the bottom flange of the bedplate (*Figure 3.*) It is often convenient to build a two inch wall of clay round the top of the foundation instead of using timber shuttering. When the grouting has set the shuttering or clay is removed and the exposed surfaces of the foundation may be rendered with cement mortar.



*3. Grout dam.*

With all but the smallest engines, it is advisable to keep the foundation block separate from the floor of the building. A gap of at least

an inch should be left between the edge of the floor and the foundation block. This space should be filled with sand and topped with four or five inches of bitumen.

At the same time as the engine foundation is being built constructional work will be proceeding. If the arrangement calls for exhaust and other pipes to be laid in a chase in the floor, the design of chase is of some importance. Provision should be made to drain any water or oil that may collect in it to a small sump from which it may be easily removed. The exhaust pipe must not be bound in concrete at any point in its length. Otherwise its expansion and contraction will either cause the concrete to crack or, what is much worse, fracture the exhaust manifold connection at the engine. A useful form of exhaust pipe support is a series of U shaped chairs made from 2 inch × $\frac{1}{4}$ inch flat bar. The chase covers should preferably be made of steel chequer plate set in a rebate flush with the floor. The use of timber for this purpose is inadvisable as it is liable to swell, making removal difficult, and it constitutes a fire hazard.

The exhaust from the engine must be led outside the building. It is customary to fit some type of silencer which takes the form of an expansion chamber, baffled or otherwise. A common type in this country, particularly in connection with slow speed horizontal engines, consists of a large, vertical, cylindrical cast iron vessel resting on the concrete apron surrounding the building. The silencer must be free to move, to accommodate the expansion of the exhaust pipe. This is best achieved by inserting two one inch diameter steel bars, to act as rollers, between the base of the silencer and its support. From the silencer a vertical open ended pipe discharges the exhaust gases into the atmosphere. This pipe should be well clear of the eaves or the exhaust gases may be blown back into the building. It is advisable to drill a small hole, about half an inch in diameter, at the base of the silencer to drain any rain water that may collect. Otherwise sufficient water may accumulate to seal off the exhaust and prevent the enginee from being started.

A. NEILSON

## Slug Mixture

In our article 'Slugs and Snails' in *Planters' Bulletin 21* we advised the use of meta baits, which are undoubtedly effective. We now find that a better method of using the poison has come into wide use in Johore, where one commonly sees the stems of all trees in an infested area treated. It deserves to be more widely known. The method consists of painting the base of the stem with a slurry of meta and whiting, in which is incorporated a little starch. A mixture which we have tested and found to be very effective had the following formula:

12 bricks of meta (about 1.7 oz)

4 lb whiting

$\frac{1}{2}$ lb tapioca flour

1 gallon water

The tapioca flour is made into a paste with two thirds of the water; with the remaining third, a mixture of finely powdered meta and whiting is made into a

cream, then the two suspensions are thoroughly stirred together. The quantities given, costing only seventy cents (Malayan), made enough of the mixture to treat the bottom foot of the stems of two thousand nine month old seedlings. The mixture is stable and dries out to form a thin crust which lasts for more than two months even in wet weather. It has no harmful effect on the youngest seedlings. The mixture can easily be applied, by hand to small plants, or by brush.

## Breakage of Clone RRIM 501

We have recently received a number of reports of damage in stands of clone RRIM 501 which have been in tapping for two or three years. Most of these reports come from plantations on inland soils in the west coast belt; in some cases the damage can be attributed to a particular storm, but in others breakages have occurred more gradually. The damage almost invariably takes the form of breaking of the trunk at or just above the level of the tapping panel. Occasionally, breakage occurs at a main fork at the base of the crown.

Investigation into the cause or causes of the damage is not yet complete, but we think it will serve a useful purpose to mention here two factors which appear to operate on most of the affected areas:

*1* Excess or unbalanced manuring (with sulphate of ammonia) which is likely to result in the formation of heavy crowns and soft wood.

*2* A denser stand than is recommended for high yielding budgrafts after the first year or two in tapping. Too dense a stand unduly depresses the girthing of the trees and results in tall spindly trees which are liable to wind damage.

It seems that buddings of RRIM 501 are particularly affected by these two factors, and that special care should be taken to adopt a balanced manuring programe and an adequate thinning schedule.

For mature stands we recommend R.R.I. mixture C 2 (68 parts sulphate of ammonia, 25 parts rock phosphate and 7 parts of muriate of potash). Manuring with sulphate of ammonia alone should be avoided, especially immediately after wintering.

A schedule of thinning should be arranged to reduce the stand to a maximum of 120 trees per acre after tapping for three years. In existing plantings of RRIM 501 in which the canopy has not yet closed over, we consider that thinning should be planned to leave 100 trees per acre after tapping for three years. It is emphasised that sudden thinning after the trees have reached maturity can have serious consequences.

## Information

Since 1953 all published material received in our Library has been screened, and that relevant to rubber planting has been card indexed according to a classification devised by the Research Association of British Rubber Manufacturers. We shall be pleased to assist anyone wishing to study original papers on any particular aspect of rubber planting, natural latex or crude rubber, if he will inquire in person at our Library.

# Index 1957

Actual titles of main articles appear in *italics*.


Abbreviations, clones 79
Accident prevention 4, 53, 69, 106
*Adoretus compressus* 80
Air dried sheet, SP 83
Aldrin, termites 98
Alignment, machinery 113
Ammonia hazard 58
*An Appeal: Felling and Plant Collecting* 39
*Anopheles maculatus* 36
Ants and black scale 18
Arsenite spraying, prior to Dowpon 28
*Axonopus compressus*, suppression 29, 99

Bacteria, latex 102
Bacterial cultures, inoculation of *Flemingia* 100
Bamboo grass, eradication 29
Bark, RRIM '600' series clones 43
Beetles, leaf eating 80
Belukar crusher 74
Boric acid, preservative 62
Botanical specimens, collection 39
Boundary demarcation, jungle clearing 106
Branch budwood 58
Branching, RRIM '600' series clones 47
Breakage, wind 46, 117
Brown bast 25, 43
B.R.P.R.A. functions 24
Buds, dormant, notching 79
Budwood, despatch 98
Budwood multiplication 58
Bunds 20
Burning jungle 105
Bush cover, *Flemingia* 99

Cess, rubber 23
*Chauliops bisontula* 50
Chlorophyll 66
Christmas Island rock phosphate 64
Clearing jungle 105
*Clonal Seed Collection Areas in Malaya and Their Improvement* 91
Clonal trials on estates 9
*Clone Abbreviation Code* 79
Clone identification inspectors 92, 104
Clones:
  recommended 10
  susceptible to Dowpon 29
  tapping recommendations 27

testing and multiplication 58
Gl 1 11, 13
GT 1 14
LCB 1320 14
PB 5/51 14
PB 5/63 14
PB 86 12
PR 107 11, 13
RRIM 501 11, 13, 117
RRIM 513 13
RRIM 519 14
RRIM 526 14
RRIM '600' series 41
Sabrang 24 11
Tjir 1 11, 13
Clutch trip 5
Coagulum, feeding into machinery 6
Coal tar fungicides 3
Coccids 17
Collection areas, clonal seed 91
Collection, pathological specimens 77
Cost, control of pests and diseases 103
Costs, SP rubber 86
Costs, weed eradication 28
Cover control, mechanical 76
Cover crops, pests 50
Cover, establishing *Flemingia* 100
Crepe, Firestone AT 3 111
Crepeing skim latex 110, 111
Crepe rubber machinery, safeguarding 4
Crepe, SP 83
Crown budding, clonal seed collection areas 94
Cyclised rubber 61

Dalapon, *see* Dowpon
*Decaying Timber Spreads Root Disease* 31
Deficiency, magnesium 66
Design, welded latex tanks 54
*Despatch of Pathological Specimens* 77
*Despatch of Planting Material* 97
Dieback, coastal clay areas 19
Dieldrin, termites 98
Dormant buds, notching 79
*Dowpon – Lalang and Grass Eradicant* 27
*Drainage on Estates* 20
Dunlop patent process, latex skim 108

*Early Rubber Research in Malaya* 81
*Editorial: High Yielding Material* 1
*Editorial: Nutritional Needs of Hevea* 63

*Editorial: Schedule III Cess* 23
*Editorial: Weighing the Losses* 103
*Effect of Manuring on Growth and Yield* 64
Emergency stop mechanism 8, 73
Endrex, fogging *Flemingia* 101
Engine foundations 88
Engines, installation 113
Enzyme digestion, skim latex 109, 111
*Epilachna indica* 50
Eradicant, lalang and grass 27
*Erection of Oil Engines* 113
Estates, drainage 20
Exhaust silencer 116
Experimental scale planting material 12

Factory equipment 4, 53, 69, 88, 113
Feeding platforms, crepe milling machines 6
Felling and plant collecting 39
Felling, root disease 32
*Ferrisia virgata* 15
Fertiliser nomenclature 90
Fertiliser trials 66
Finance, rubber research and development 24
Fire belts 106
Firestone AT 3 crepe 111
*Flemingia congesta,* propagation 99
*Fomes* root diseases 31
Formula, vulcanising suspension, SP rubber 84
*Foundations for Oil Engines* 88
Fungicides, mouldy rot 3, 19
Fylomac 90, 19

*Ganoderma pseudoferreum* 32
Germinated seed, planting position 38
Germination, clonal seeds 97
Girth records, RRIM '600' series clones 45
Glasshouse, special 96
Government Rubber Replanting Schemes 91
Grasses, identification 112
Grasses, suppression and eradication 27, 99
Growth and yield, effect of manuring 64
Guards, machinery 69

Hazard, fire 106
Hazards, factory 4, 53, 69
Health, malaria 37
High yielding material, brown bast 25
High yielding material, *Editorial* 1
High yielding rubber, definition 91

History, rubber regulation 23
History, rubber research 81
Holt weed breaker 82

Identification, clones 92, 104
Identification, grasses 112
*Imperata cylindrica* 27
Improved skim rubber 108, 111
Information source 117
Inoculation, *Flemingia* seed 100
Insecticides, malarial mosquito 38
Insect pests 15, 50
Insects, packing specimens 77
Inspection of clonal seed collection areas 92
Installation, machinery 88
Intensity, tapping 26
International grades 61
Interveinal yellowing 67
*Ischaemum muticum*, eradication 29

Journal 101
*Jungle Clearing* 105

Kieserite (Epsom salts) 68

Ladybird beetle 50
Lalang eradicant, Dowpon 27
Laminators, safety 7
*Lamprosema diemenalis* 50
Latex concentrate preservative 62
Latex, microbes 102
*Latex Skim : The Dunlop Process* 108
Latex tanks, design and safety 53
Law, sheeting batteries 69
Leaf eating beetles 80
Legume cover crops, pests 50
Legume cover, *Flemingia* 99
Legume covers, effect of Dowpon 30
*Lepidosaphes cocculi* 15, 18
Life cycle, mealy bugs 17
Lump scrap, feeding into machinery 6

Machinery safety 4, 69
*Magnesium Deficiency* 66
Magnesium fertilisers 68
Malaria, replanting 35
Malayan Rubber Fund 23
Malformation, seedling stem 38
Manhole covers 57

Manures, nomenclature 90
Manuring, effect on growth and yield 64
Mealy bugs 15
Mealy bugs on the tapping panel 40
Mechanical weed control 74
Microbes in latex 102
Milling machinery, safety 5
Mineral nutrition 96
Mosquito, *Anopheles maculatus* 36
Mouldy rot fungicides 3, 19
*Multiplication and Testing of New Clones* 58
Muriate of potash 64

Natural rubber grades 61
Nitrogen requirement 65
Nodulation, *Flemingia* 100
Nomenclature, fertiliser 90
Notching dormant buds 79
N.R.D.B. functions 24
Nurseries, multiplication and seedling stock 58
Nutritional needs of hevea 63

Oil engines, erection 113
Oil engines, foundations 88
Oil wiping, after Dowpon 28

Packing pathological specimens 77
Packing planting material 97
Packing sole crepe 104
Packing specifications, RMA booklet 61
Panels, tapping 27
Parentage of mother trees, RRIM '600' series clones 43, 45
Patents, R.R.I. 62
Patents, skim latex 108, 111
Pathological specimens, despatch 77
*Pests of Legume Cover Crops* 50
Phosphate requirement 65
Pink disease incidence 62
Pink disease, RRIM '600' series clones 46
*Planococcus citri* 40
Plant collecting, after felling 39
Planting material, despatch 97
Planting material, high yielding 1, 10
Planting position, newly germinated seed 38
*Planting Recommendations, 1957-8* 10
Plant, SP rubber 85
Plot design, trials 59
Poisoning hevea 95, 104
Potassium requirement 65

Preservative, latex concentrate 62
Pretreatment, *Flemingia* seed 100
Production, SP rubber 84
*Propagation of Flemingia* 99
Proteins, skim latex 108, 111
*Pulvinaria maxima* 15, 18

Quality, natural rubber 61

Recommendations, planting 1957-8 10
Recommendations, tapping young hevea 25
Recording yields, trials 60
Registration, clonal seed collection areas 92
Renewed bark, RRIM '600' series clones 43
*Replanting and Malaria* 35
Replanting grants, approved material 91
Replanting, root disease 33
Replanting, tapping before 3
Rhizomorphs, *Fomes lignosus* 31
Rogue trees, clonal seed collection areas 95
Root disease economics 103
Root disease, spread from decaying timber 31
Root nodule bacterial cultures, *Flemingia* 100
*RRIM '600' Series Clones* 41
R.R.I. of Malaya, functions 24
Rubber Industry (Replanting) Fund Ordinance 91
Rubber research in Malaya, early 81
Rubber, superior processing 83

*Safeguarding Crepe Rubber Machinery* 4
Safety, factory 4, 53, 69
*Safety of Welded Latex Tanks* 53
*Saissetia nigra* 15
Saprophyte, definition 31
*Scale Insects and Mealy Bugs* 15
Scrap washers, safety 8
Sedges (*Scleria* spp), eradication 30
Seed collection areas 91
Seed identification 104
Seedling stock nursery 58
Seedling stocks, AVROS 163 11
Seedling trees, tapping recommendations 27
Seed production, *Flemingia congesta* 100
*Sheeting Batteries and the Law* 69
Shrub cover, *Flemingia* 99
Silencer, exhaust 116
Singapore type descriptions, RMA booklet 61
Skim latex, Dunlop process 108
Skim latex, Firestone process 111

Slug mixture 116
Small scale trials, new clones 58
Sole crepe, packing 104
Specifications, natural rubber 61
Specimens, pathological, despatch 77
Spraying, arsenite and Dowpon 28
Spraying *Flemingia* seed garden 101
SP rubber 83
Storage tanks, latex, design 54
Stumps, despatch 98
Stumps, jungle 107
Stumps, root disease 33
Sulphate of ammonia 64
Surface water 20
*Superior Processing Rubber* 83

Tanks, latex 53
Tapping before replanting 3
Tapping organisation, high yielding material 2
*Tapping Young Rubber – Revised Recommendations* 25
Termite control 98
Testing new clones 58
Thinning with 2,4,5-T 104
Tidal control gates 20
Timber, decaying, root disease 31
*Treatment of Skim Rubber* 111
Trials, clonal 9, 41
*Trial of the Holt Weed Breaker* 74
Trials, manuring 64
Trials, plot designs 59
Trip wire, machinery 73
Trypsin treatment, skim latex 109
Tunnel guard 71
Type descriptions and packing specifications 61

Vector mosquito, *Anopheles maculatus* 36
Vigour, RRIM '600' series clones 45
Vulcanising latex, SP rubber production 84

Waterways 20
Weed breaker, Holt 74, 82
Welded latex tanks 53
Wind damage, RRIM clones 46, 117
Wiping, oil 28

Yellowing, interveinal 67
Yield and growth, effect of manuring 64
Yield records, commercial 14
Yield records, RRIM '600' series clones 43

# Rubber Developments

The latest information on new processes as well as uses of natural rubber appear in the quarterly *Rubber Developments*, which is designed for consumer and manufacturing readers. With the increasing interest on estates in meeting consumers' needs by the production of special rubbers and by new packing methods, and with the ever widening scope for local manufacture, readers of *Planters' Bulletin* will find many articles of interest and value in this publication.

In Malaya, *Rubber Developments* is available gratis on application to: The Manager, The Natural Rubber Development Board, Post Office Box 666, Kuala Lumpur.

The Natural Rubber Development Board issue a wide range of technical and semi-technical literature on various aspects of natural rubber; a full list can be obtained from the above address.

The Standard Engravers & Art Printers, 63 Campbell Road, Kuala Lumpur, Selangor